1 PROVIDING MULTIPLE LEVELS OF INTERACTIVE TELEVISION

2 SERVICE USING TRIGGERS AND TRIGGER FILTERS

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7 BACKGROUND OF THE INVENTION

8   Figure 1 depicts a conventional interactive television

9 system 100, including a broadcast television transmitter 105, a

10 broadcast antenna 110, and a pair of receiver units 115 and

11 120. Receiver units 115 and 120, also referred to as "Internet

12 terminals" or "set-top boxes," allow viewers to interact with

13 network content via bi-directional (i.e., two-way) connections

14 122 and 123, watch broadcast television via a unidirectional

15 (i.e., one-way) broadcast connection between antenna 110 and

16 the receiver units, or simultaneously do both.

17   Receiver units 115 and 120 merge network and broadcast

18 experiences, displaying icons, data, and other information

19 along with broadcast video. Much of the displayed information

20 is interactive, which is to say that the viewer can interact

21 with the information to obtain a personalized experience. For

22 example, an icon broadcast with a TV commercial can provide a

23 link to additional information about an advertised product or

24 service.

25   Broadcasters present viewers with interactive information

26 by broadcasting a "trigger" 126 along with television video

27 130. Trigger 126 may include the interactive information

28 and/or may provide a link to additional information resources.

29 A link to additional information might include the pathname of

1 a local file on receivers 115 and 120 or a Uniform Resource

2 Identifier (URI) for an Internet resource, such as a sponsor's

3 Web site.

4   Web pages and other information resources that require a

5 bi-directional connection to a remote information store are

6 termed "connected content." Locally stored information

7 resources that can be accessed without a bi-directional

8 connection to a remote information store are termed

9 "disconnected content." A locally stored electronic

10 programming guide stored in local memory is an example of

11 disconnected content. Disconnected content may include links

12 to connected content.

13   A trigger identifying connected content typically causes

14 receiver units 115 and 120 to display an icon offering a viewer

15 the option of purchasing an advertised item by selecting the

16 icon and filling out an order form. In the example of Figure

17 1, trigger 126 has caused receiver units 115 and 120 to display

18 an icon 135 that provides a hyperlink to an order form 145 on a

19 remote information store 150. If a viewer selects icon 135

20 using e.g. a handheld remote control unit 140, then the

21 viewer's receiver unit requests and receives order form 145.

22 The viewer can then interact with order form 145 to submit

23 user-specific information back to a merchant's server.

24   A trigger identifying disconnected content may also cause

25 receiver units 115 and 120 to display an icon, but the

26 information associated with the icon will be accessible without

27 a bi-directional connection to remote information stores. For

28 example, such a trigger might refer to an electronic

29 programming guide stored in local memory on receiver units 115

30 and 120. Disconnected content can be delivered to receiver

31 units 115 and 120 in a number of ways; for example, the viewer

32 may load the content into local memory, or the content may be

1 encoded into a broadcast television signal and transmitted to
2 receiver units 115 and 120 for local storage.

3   Vendors who lease or sell receiver units provide their
4 customers access to remote information stores, typically for a
5 fixed monthly fee. These vendors in turn buy bandwidth from
6 network equipment companies that supply the necessary hardware
7 to connect receiver units to remote information stores. In a
8 typical agreement between a receiver-unit vendor and a network
9 equipment company, the costs to the vendor depend upon whether
10 and how long their customers connect to remote information
11 stores. Furthermore, the time during which a customer connects
12 to a remote information store affects the charges accrued by
13 service suppliers, peak-usage periods typically costing more
14 per unit time than do periods of lower activity. Thus, the
15 connection costs incurred by receiver-unit vendors depend upon
16 whether and when their customers connect to remote information
17 stores.

18   Receiver-unit vendors would like to offer different levels
19 of service at different prices, so that customers who connect
20 to remote information stores pay for the additional costs
21 associated with connecting. By making customers who connect to
22 remote information stores pay for connection costs, receiver-
23 unit vendors (and others who support interactive television)
24 can offer a lower level of interactive television service for
25 cost-sensitive customers who do not want to pay to connect to
26 remote information stores.

27

28 <u>SUMMARY</u>
29   The present invention employs a system of broadcast
30 triggers in which connectivity values identify associated
31 information resources as either "connected content" or
32 "disconnected content." The term "connected content" refers to

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1   information resources, such as Web pages, that are accessed via

2   bi-directional connections to remote information stores; the

3   term "disconnected content" refers to information resources,

4   such as a locally stored program guide, that do not require

5   such a bi-directional connection.

6   In accordance with an embodiment of the invention,

7   receiver units that are temporarily or permanently incapable of

8   establishing bi-directional connections to remote information

9   stores ("disconnected receivers") can identify and reject

10   triggers that direct the viewer to connected content (i.e.,

11   connected-content triggers) by examining the connectivity

12   values of incoming triggers. Thus, content providers can

13   broadcast connected-content triggers to connected and

14   disconnected receiver units without interrupting disconnected

15   receiver units with triggers they cannot execute. Furthermore,

16   the ability to distinguish between connected-content triggers

17   and disconnected-content triggers allows service providers to

18   offer a lower level of service to those users who do not wish

19   to pay for the ability to establish a bi-directional connection

20   to remote information stores.

21   In accordance with another embodiment of the invention,

22   service suppliers can offer a semi-connected level of service

23   to customers who opt for limited access to remote information

24   stores. For example, such users may agree to be barred access

25   to connected content during peak hours, or for more than a

26   certain number of hours per month.

27   Disconnected receiver units include a trigger filter that

28   can distinguish between disconnected-content triggers and

29   connected-content triggers. Disconnected receiver units filter

30   out connected-content, and so do not interrupt the respective

31   viewers with links to inaccessible content. Filters in

32   receiver units adapted to provide the semi-connected level of

1   service recognize a third type of trigger that can be executed

2   at a later time, allowing customers of this level of service to

3   take advantage of less expensive off-peak rates offered by

4   network equipment companies.

5   Other features of the present invention will be apparent

6   from the accompanying drawings and from the detailed

7   description that follows.

8

9   <u>BRIEF DESCRIPTION OF THE DRAWINGS</u>

10   Figure 1 (Prior Art) is a diagram of an interactive

11   television system 100.

12   Figure 2 is a simplified diagram of a pair of triggers

13   that include connectivity attributes.

14   Figure 3 is a simplified diagram of an interactive

15   television system 300 in accordance with one embodiment of the

16   present invention.

17   Figure 4 is a flowchart depicting methods carried out by

18   system 300 of Figure 3.

19   Figure 5 is a simplified diagram of an interactive

20   television system in accordance with an embodiment of the

21   present invention.

22

23   <u>DETAILED DESCRIPTION</u>

24   The present invention enables vendors who lease or sell

25   receiver units to offer different levels of service to

26   receiver-unit customers. One level of service allows customers

27   to exchange information with remote information stores. For

28   example, this level of service might allow customers to

29   establish dial-up or cable connections to dedicated servers, or

30   to Web servers via the Internet. Broadcasters can send these

31   customers links, in the form of broadcast "triggers," to Web

32   servers that provide the customer with additional information

1 relating to a broadcast program or commercial. Customers can

2 then select such links to access the additional information.

3 Selecting a link establishes a bi-directional connection to the

4 resource indicated by the link. In accordance with one

5 embodiment of the invention, information resources, such as Web

6 pages, that require a bi-directional connection from a receiver

7 unit are termed "connected content."

8   Some customers are either unable or unwilling to access

9 connected content. These customers may be uncomfortable with

10 the idea of exchanging information with remote sites or may

11 simply be unwilling to pay for the requisite connectivity. The

12 present invention supports such customers by allowing receiver-

13 unit vendors to supply "disconnected" receiver units that do

14 not support the ability to access connected content.

15 Disconnected receiver units provide access to interactive

16 information, but this information is limited to information

17 that is transmitted in a broadcast video channel, stored

18 locally in the receiver unit, or both. Such information,

19 termed "disconnected content," typically includes electronic

20 program guides, electronic newspapers, or program reminders.

21   Disconnected receiver units in accordance with the

22 invention include a trigger filter that distinguishes between

23 triggers that direct the viewer or receiver unit to connected

24 content (i.e., connected-content triggers) and triggers that

25 direct the viewer or receiver unit to disconnected content

26 (i.e., disconnected-content triggers). Disconnected receiver

27 units filter out connected-content triggers, and so do not

28 interrupt the respective viewers with links to inaccessible

29 content.

30   Connected- and disconnected-content triggers can be

31 transmitted in the vertical-blanking interval (VBI) of an

32 analog broadcast video signal. The text service channels of

1   line 21 of the VBI provide a robust communication medium,

2   albeit at relatively low bandwidth. In some embodiments of the

3   invention, triggers are text based, and their syntax follows a

4   basic format that complies with the Electronic Industries

5   Association EIA-746A, "Transport of Internet Uniform Resource

6   Locator (URL) Information Using Text-2 (T-2) Service"

7   (September 1998), which is incorporated herein by reference.

8   EIA-746A defines the formatting necessary to transmit Internet

9   URLs using the vertical-blanking interval of a broadcast

10 television signal, and is incorporated herein by reference.

11 For further details regarding acceptable trigger syntax, see

12 the Advanced Television Enhancement Forum Specification

13 (ATVEF), Versions 1.1 revision 26, (2/2/99), which is

14 incorporated herein by reference.

15   In one embodiment that complies with EIA-746A, each

16 trigger includes a uniform resource identifier (URI) followed

17 by zero or more fields and an optional checksum. Each field,

18 in turn, includes an attribute/value pair. The following

19 illustrates typical trigger format:

20

21 <uri> [attr$_1$:val$_1$] [attr$_2$:val$_2$] ... [attr$_n$:val$_n$] [checksum]

22

23   Figure 2 depicts an exemplary connected-content trigger

24 200 and an exemplary disconnected-content trigger 230. Trigger

25 200 includes a URI field 205, a connectivity field 210, an

26 "expires" field 215, and a checksum 220.

27   In connected content trigger 200, URI field 205 identifies

28 a Web page presenting additional information about a product,

29 service, or event related to a broadcast television program or

30 commercial. The same field 205 in disconnected content trigger

31 230 identifies a resource local to receiver units configured to

32 receive and understand trigger 230.

1   Connectivity field 210, identified by a connectivity

2 attribute 222, includes a connectivity value 225 indicating

3 whether URI 205 addresses connected content. In connected-

4 content trigger 200, a connectivity value of "true" indicates

5 that URI 205 addresses connected content; in disconnected-

6 content trigger 230, a connectivity value of "false" indicates

7 that the associated URI 205 addresses disconnected content.

8 Connectivity value 225 may be set to "true" even if URI 205 is

9 directed to disconnected content that includes links to

10 connected content. For example, a connected-content trigger

11 may call up a form in local memory (disconnected content) that,

12 once filled out, requires a connection for submission. Thus,

13 URI 205 is directed to a local resource, but the author of the

14 trigger might nevertheless label set value 225 to "true" to

15 avoid interrupting viewers with a form they cannot use.

16   The "expires" field 215 is optional, and can be used to

17 provide a time stamp indicating a time at which trigger 200

18 expires. One embodiment employs the form *yyyymmddThhmmss*,

19. where the capital letter "T" separates the date from the time.

20 The time string may be shortened by reducing the resolution.

21 For example *yyyymmddThhmm* (no seconds specified) is valid, as

22 is *yyyymmdd* (no time specified at all). When no time is

23 specified, the trigger expires at the beginning of the

24 specified day. The "expires" attribute can be abbreviated as

25 the single letter "e" (e.g., [e:19991031] causes trigger 200 to

26 expire on October 31, 1999). The "expires" field 215 ensures

27 that information contained in triggers is timely. Without this

28 attribute, a rebroadcast of a show might provide a "stale" link

29 that is no longer directed to a valid information resource.

30   Checksum 220 can be appended to the end of trigger 200 to

31 detect data corruption that may occur during receipt or

32 transmission of a trigger. One embodiment employs a two-byte

1 hexadecimal checksum produced by the standard TCP/IP checksum

2 algorithm described in Request For Comments (RFC) 719,

3 "Internet Protocol," September 1981, which is incorporated

4 herein by reference.

5   Figure 3 is a simplified diagram of an interactive

6 television system 300 in accordance with one embodiment of the

7 invention. System 300 includes a broadcast antenna 301

8 broadcasting television video 302 and respective connected-

9 content and disconnected-content triggers 200 and 230. System

10 300 also includes a first television receiver unit 305 and a

11 second television receiver unit 306. Receiver units 305 and

12 306 provide customers access to interactive content using an

13 ordinary TV set 308 as a display and a remote control 309 or

14 wireless keyboard (not shown) for user input. Receiver units

15 305 and 306 include respective trigger filters 307 and 310. As

16 discussed below in detail, trigger filters 307 and 310 can be

17 configured to accept or reject connected-content triggers.

18   Receiver unit 305, a "connected" receiver unit, can

19 establish and maintain a connection 320 to a remote information

20 store 315. Receiver unit 306, a "disconnected" receiver unit,

21 is not configured to connect to remote information store 315.

22 Remote information store 315 is, in one embodiment, a server

23 controlled by a television sponsor, and includes a digital form

24 325 adapted to query prospective buyers who access information

25 store 315 via connection 320. Connection 320 may be any

26 suitable bi-directional connection, including a POTS (plain old

27 telephone service), Integrated Services Digital Network (ISDN),

28 T1, fiber optic link, cable modem, or satellite.

29   In one embodiment, receiver units 305 and 306 are WebTV®

30 set-top Internet Terminals similar to those described in the

31 following documents, but modified to support features of the

32 invention:

1.   U.S. Patent Application Serial Number 09/099,118,
      entitled "Communicating Logic Addresses Of Resources
      In A Data Service Channel Of A Video Signal," filed
      June 17, 1998, by Daniel J. Zigmond, et al.;

2.   U.S. Patent Application Serial Number 09/295,746,
      entitled "Enabling and/or Disabling Selected Types Of
      Broadcast Triggers," filed April 20, 1999, by Timothy
      F. Park, et al.; and

3.   U.S. Patent Application Serial Number 09/295,436,
      entitled "Receiving An Information Resource From The
      Internet If It Is Not Received From A Broadcast
      Channel," filed April 20, 1999, by Daniel J.
      Zigmond, et al.

The content of these documents is incorporated herein by
reference. Receiver units 305 and 306 may be other types of
receiver units, such as a personal computer having a television
tuner card such as the "Windows® 98 Broadcast PC" system.

      Figure 4 is a flowchart 400 illustrating receiver methods
of receiver units 305 and 306. Each of receiver units 305 and
306 receives connected-content trigger 200 of Figure 2 (steps
405 and 407). Connected receiver unit 305 subjects trigger 200
to filter 307, which is configured to accept connected-content
triggers. Thus, filter 307 forwards connected-content trigger
200 for execution in step 410. In the example of Figure 3,
executing trigger 200 causes an icon (not shown) to be
displayed on display 308 of receiver unit 305. If the viewer
selects the icon using e.g. handheld remote control unit 309,
then receiver unit 305 retrieves form 325 from remote
information store 315 and presents form 325 to the viewer. The
viewer may then use form 325 to provide personalized
information to the entity that maintains information store 315.
In a typical example, a viewer fills in form 325 to request

1 additional information about a product or service presented to

2 the viewer during a television advertisement.

3   Returning to Figure 4, disconnected receiver unit 306

4 subjects trigger 200 to filter 310, which is configured to

5 reject connected-content triggers. That is, filter 310 checks

6 connectivity value 225 of connectivity field 210 (both of

7 Figure 2) and determines that value 225 is "true," indicating

8 that trigger 200 is associated with connected content. Filter

9 310 therefore rejects trigger 200 in a decision depicted as

10 step 415. In rejecting trigger 200, receiver unit 306 simply

11 ignores trigger 200 (step 420) and awaits a subsequent trigger.

12   Next, receiver 305 and 306 receive disconnected-content

13 trigger 230, in which connectivity value 225 is "false." This

14 value indicates that trigger 230 is associated with content

15 that is to be made available disconnected receiver units.

16 Thus, filter 310 passes trigger 230 (step 415). Disconnected

17 receiver unit 306 then executes trigger 230 (step 425), which

18 is to say that receiver unit 306 carries out some instruction

19 expressed by trigger 230. For example, receiver unit 306 might

20 display an icon presenting a link a program guide, or some

21 other local resource. Filter 307 also passes disconnected-

22 content triggers, so connected receiver unit 305 also executes

23 disconnected-content trigger 230.

24   For a more detailed treatment of triggers and trigger

25 filters, see co-pending application serial number 09/295746

26 entitled "Enabling and/or Disabling Selected Types of Broadcast

27 Triggers," by Timothy F. Park, Dean J. Blackketter, and Sandra

28 R. Bernardi, the contents of which is incorporated herein.

29   Vendors of receiver units typically provide customers

30 access to remote information stores for a fixed monthly fee.

31 Vendors, in turn, buy bandwidth from network equipment

32 companies that supply the necessary hardware to connect

1 receiver units to remote information stores. In a typical

2 agreement between a vendor and a network equipment company, the

3 costs to the vendor depend upon the time during which customers

4 connect, peak-usage periods typically costing more per unit

5 time than periods of lower activity. Thus, the connection

6 costs incurred by vendors depend upon whether and when their

7 customers connect to remote information stores.

8   One embodiment of the invention allows vendors to offer

9 receiver-unit customers a level of service that allows access

10 to connected content only during specified times, such as

11 during periods of relatively low activity. In accordance with

12 this embodiment, some receiver units are configured to ignore

13 connected-content triggers during specified time periods, or to

14 store connected-content triggers for execution at a later time.

15 For example, a viewer might execute a link to connected content

16 that provides additional information about an advertised

17 product or service. The viewer's receiver unit might then

18 store the link for execution at a later time.

19   Figure 5 is a simplified diagram of an interactive

20 television system 500 in accordance with an embodiment of the

21 invention that allows vendors to offer receiver-unit customers

22 what might be called a "semi-connected" level of service.

23 System 500 includes many of the components discussed above in

24 connection with Figure 3, like-numbered elements being similar.

25 System 500 additionally includes a semi-connected receiver unit

26 505 that acts as a connected-content receiver at times

27 determined by connectivity information stored in a local memory

28 508. During those times, receiver unit 505 can establish or

29 maintain a bi-directional connection 510 to remote information

30 store 315. At other times, receiver unit 505 acts like

31 disconnected receiver unit 306 of Figures 4 and 5. Thus, the

32 configuration data in local memory 508 allows receiver unit 505

1 to access connected content only during proscribed periods.

2 Alternatively, receiver unit 505 might filter out connected-

3 content triggers during proscribed periods and nevertheless

4 allow the viewer to access connected content, as desired,

5 during those periods.

6   Some types of connected content may not make sense if

7 retrieved later. For example, an enhancement to a broadcast

8 television show may be "stale" if presented during a subsequent

9 program. Other types of connected content are better suited

10 for delayed execution. For example, a television commercial

11 may offer a connected-content link to additional information

12 about an advertised product, such as the current price.

13 Selecting the link may prompt the sponsor to send the viewer

14 additional information via e-mail, conventional mail, or

15 telephone. In such a case, the viewer need not establish a

16 connection right away to obtain the desired response from the

17 sponsor. It might therefore make sense accept viewer requests

18 and send them in later when a connection is established.

19   Figure 6 depicts a trigger 600 in accordance with an

20 embodiment of the invention that supports connectivity

21 attributes that identify triggers that may be executed at a

22 later time. Trigger 600 is similar to triggers 200 and 230 of

23 Figure 2, like-numbered features being the same. Trigger 600

24 is different, however, in that connectivity value 225 is set to

25 "later," indicating that trigger 600 refers to connected

26 content that is suitable for future access.

27   Trigger 600 can be executed immediately by connected

28 receiver units, but can also be executed later by semi-

29 connected receiver units. For example, a semi-connected

30 receiver unit may store trigger 600, or some portion thereof,

31 for later execution. The semi-connected receiver unit then

32 executes each trigger in local memory when a connection is

13

1   established at some later time. The later time might be a time

2   of day, the end of a random or specified period from receipt of

3   the trigger, or the next time the viewer initiates a

4   connection.

5   Receiver units 305, 306, and 505 may be hard-wired to

6   function as connected, disconnected, or semi-connected receiver

7   units. Alternatively, their respective functionality can be

8   defined by configuration data stored in local memory (e.g.,

9   memory 508). This alternative allows vendors to preset and/or

10   remotely modify receiver units to establish a desired level of

11   service. In other embodiments, the customer can select between

12   connected, disconnected, and semi-connected receiver

13   configurations. The customer may therefore decide whether he

14   or she wishes to be notified of connected content. Local

15   memory can be any physical medium that stores configuration

16   data associated with the level of connectivity, including a

17   RAM, hard and floppy disks, CD-ROM, DVD, and flash ROM.

18   Connectivity field 210 (Figures 2 and 6) can support

19   additional connectivity values. For example, the presence of

20   field 210 can indicate that the associated trigger refers to

21   connected content, and the absence of field 210 can indicate

22   that a trigger refers to disconnected content. In other

23   embodiments, connectivity value 225 can be can be assigned a

24   variable indicating the likelihood that the associated trigger

25   will require access to connected content. Such variable can be

26   numbers that range from zero (zero percent likelihood of

27   involving a connection to a remote information store) to one

28   hundred (a one hundred percent likelihood of involving a

29   connection to a remote information store). Receiver units can

30   then determine whether to execute a given trigger based on the

31   likelihood that the trigger involves a connection. This

32   embodiment may be used when a trigger identifies a number of

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1   resources, only some of which are directed to connected

2   content.

3   In another embodiment, disconnected receiver units reject

4   triggers to connected content not by ignoring them, but instead

5   provide the viewer with an indication that a displayed link

6   cannot be executed. Disconnected receiver units may, for

7   example, provide a message indicating that selecting a

8   displayed icon will have no effect.

9   In yet another embodiment, connected content and

10 disconnected content are defined as set forth in the U.S.

11 patent application Serial No. 09/345,247, entitled "Interactive

12 Television Triggers Having Connected Content/Disconnected

13 Content Attribute," by Leak et al., which is incorporated

14 herein by reference.

15   Although the present invention is described in connection

16 with certain specific embodiments for instructional purposes,

17 the present invention is not limited thereto. Accordingly,

18 various modifications, adaptations, and combinations of various

19 features of the described embodiments can be practiced without

20 departing from the scope of the invention as set forth in the

21 claims.